

REMARKS

Applicants thank the Examiner and the Examiner's supervisor for the courtesy extended to Applicants' attorney during the interview held September 14, 2004, in the above-identified application. During the interview, Applicants' attorney explained the presently-claimed invention and why it is patentable over the applied prior art, and discussed other issues raised in the Office Action. The discussion is summarized and expanded upon below.

The rejections under 35 U.S.C. § 103(a) as unpatentable of:

Claims 1, 3-5, 7, 9-12 and 14 over U.S. 4,337,279 (Polak) in view of U.S. 5,179,160 (Orikasa et al '160),

Claims 1, 3, 5-12 and 15 over Polak in view of U.S. 5,578,679 (Suzuki et al);

Claims 1, 3, 5, 7, 9-12 and 16 over Polak in view of U.S. 5,157,070 (Orikasa et al '070), and

Claims 1, 5, 11 and 13 over Polak in view of U.S. 5,681,893 (Bailly et al),  
are respectfully traversed.

In the discussion below, where an argument applies to all the applied prior art other than Polak, that prior art is referred to as "the secondary references."

The present invention relates to a resin molded component whose surface is coated with metal by a physical deposition method. As disclosed in the specification under "Description of the Related Art" beginning at page 1, second paragraph, due to the generally low adhesion of a metal to a resin molded component comprised of a thermosetting resin or a thermoplastic resin, especially when the metal layer is formed by a dry physical deposition method such as sputtering, vacuum evaporation, or ion plating, it is known to improve the adhesion of the metal layer by plasma-treating the surface of the resin molded component prior to carrying out the physical deposition. However, even such plasma treatment is insufficient.

Applicants have discovered that by including a rubber-like elastic material in the base resin comprised of a thermoplastic resin or a thermosetting resin, improved metal adhesion as well as other improved properties are obtained.

The comparative data of record demonstrates the effectiveness of the presence of the rubber-like elastic material. The particular base resins and rubber-like elastic materials used in the Examples and Comparative Examples are described in the specification at page 26, last line, through the third line from the bottom of page 27. Examples 1-8 and Comparative Examples 1-6 were subjected to a peel test, and linear expansion coefficient was measured for some of the Examples and Comparative Examples. The results are shown in Table 1 at page 39 of the specification, reproduced below:

Table 1

	Base resin		Rubber-like elastic material		Rating	
	Kind	Mixing amount (parts in mass)	Kind	Mixing amount (parts in mass)	90° peel strength (N/mm)	Linear expansion coefficient ( $\times 10^{-6}/^{\circ}\text{C}$ )
Example 1	PPA	100	A	3	0.86	130
Example 2	PPA	100	B	3	0.86	-
Example 3	PPA	100	C	3	0.80	-
Example 4	PPA	100	D	3	0.75	-
Example 5	PPA	100	A	0.5	0.80	123
Example 6	PPA	100	A	10	0.86	150
Example 7	PPS	100	C	3	1.1	-
Example 8	PPA	100	B	3	0.86	-
Comparative Example 1	PPA	100	-	-	0.72	120
Comparative Example 2	PPS	100	-	-	0.60	-
Comparative Example 3	PET	100	-	-	0.40	-
Comparative Example 4	PET	100	A	3	0.44	-
Comparative Example 5	PBT	100	-	-	0.41	-
Comparative Example 6	PBT	100	A	3	0.43	-

The data show, first of all, that the presence of the rubber-like elastic material produces a higher 90° peel strength rating, i.e., better adhesion. During the above-referenced interview, the Examiner focused on Comparative Example 1 in comparison to Example 4, which the Examiner finds shows no significant difference in 90° peel strength rating --0.75 vs. 0.72-- when the rubber-like elastic material is "D" (which is recited in Claim 16); and Comparative Example 2 in comparison to Example 7, which the Examiner finds is the only comparison for PPS, and exemplifies only rubber-like elastic material is "C" (which is recited in Claim 15). In reply, the data still show that adhesion is improved by adding a rubber-like elastic material to a base resin of the present invention, which is not suggested by the applied prior art. The data for PPS show a significant improvement, i.e., 1.1 vs. 0.60 in 90° peel strength rating. In addition, since none of the prior art discloses PPA (a polyphthalamide), the significance of the difference in 90° peel strength rating is moot.

As previously pointed out, comparing the Examples to Comparative Examples 4 and 6 demonstrates the improved results obtained when PPA or PPS (a polyphenylene sulfide) is used as the base resin, as opposed to PET or PBT. Note that Claim 1 explicitly limits the base resin to materials inclusive of PPA and PPS. None of the applied prior art could have predicted the superiority of PPA or PPS in this environment.

In sum, the above-discussed comparative results could not have been predicted by the applied prior art.

Polak discloses a method for increasing the peel strength of metal clad polymers by treating a polymer with a gas plasma prior to deposition of the metal thereon. Thus, Polak is no more relevant than what Applicants have already admitted is known in the art. Recognizing the deficiencies in Polak, the Examiner relies, alternatively, on Orikasa et al '160, Suzuki et al, Orikasa et al '070, and Bailly et al.

However, none of the secondary references remedies the above-discussed deficiencies of Polak.

Orikasa et al '160 discloses a thermoplastic resin composition comprising 50-99% by weight of a polyamide resin, and 50 to 1% by weight of a multiphase structure thermoplastic resin which is composed of 5 to 95% by weight of at least one particular ethylene copolymer and 95 to 5% by weight of a vinyl polymer or copolymer obtained from at least one vinyl monomer, either or both of the components possessing a dispersion phase where each particle has a diameter of 0.001 to 10  $\mu\text{m}$  (column 2, lines 29-43). Orikasa et al '160 is concerned with solving conventional disadvantages, i.e., to improve impact resistance and hygroscopicity/while simultaneously maintaining mechanical and thermal characteristics of the polyamide resins (column 2, lines 12-16).

Suzuki et al discloses a flame-resisting resin composition comprising a polyarylene sulfide and as an impact modifier, a graft copolymer composed of an olefinic copolymer (a) having 30 to 59% by weight (based on the weight of the graft copolymer) of an  $\alpha$ -olefin repeating unit and a glycidyl ester residue repeating unit of an  $\alpha,\beta$ -unsaturated monocarboxylic acid, and at least one of polymers (b) having the repeating unit represented by a particular formula (I), the olefinic copolymer (a) being branched or crosslinked with at least one of the polymers (b) (column 2, lines 18-35). Suzuki et al is concerned with finding a flame-resisting resin composition exhibiting a particular flame-resistance and having a high impact resistance (paragraph bridging columns 1 and 2).

Orikasa et al '070 is directed to increasing the compatibility of a polyarylate resin with a polyarylene sulfide resin (column 1, lines 39-45), which involves a thermoplastic resin composition comprising (I) 99 to 1 parts by weight of a polyarylate resin, and (II) 1 to 99 parts by weight of at least one selected from a polyamide resin and a polyarylene sulfide resin, with (III) 0.1 to 100 parts by weight based on 100 parts by weight of the resins (I) +

(II), of a multi-phase structure thermoplastic resin which is composed of 5 to 95% by weight of an epoxy group-containing olefin copolymer and 95 to 5% by weight of a vinyl polymer or copolymer obtained from at least one kind of vinyl monomer, either or both the components being in the state of a dispersion phase having a particle diameter of 0.001 to 10  $\mu\text{m}$  (Abstract). Orikasa et al '070 rely on said component (III) to improve the compatibility.

Bailly et al discloses a polymer mixture comprising a polyarylene sulfide, an elastomeric polymer having reactive groups which are capable of reacting with the polyarylene sulfide, and a metal salt of a fatty acid having a melting temperature lower than the corresponding temperature of the polymer mixture, wherein the metal salt contributes to an improvement of the mechanical properties, in particular, the ductility (Abstract).

Without the present disclosure as a guide, it is not clear why one skilled in the art would choose any of the compositions of the secondary references, out of the thousands, if not more, of known polymer compositions to use as the polymer component of Polak. Nor without the present disclosure as a guide would a person skilled in the art choose a polyphthalamide or a polyphenylene sulfide (neither of which are exemplified in any example) from the almost limitless group of thermoplastic and thermosetting polymers within the ambit of Polak (column 2, lines 38-61). Note that none of the secondary references discloses or suggests anything with regard to depositing a metal on their thermoplastic resin composition. Thus, there can be no motivation to combine Polak and any of the secondary references. Moreover, even if one skilled in the art did combine Polak and any of the secondary references, the above-discussed comparative results could not have been predicted.

With regard to the problems disclosed by the respective secondary references, to which their respective inventions are directed, the Examiner has produced no evidence that any of these problems exist in Polak. As noted at the interview, such evidence does not have to be disclosed in Polak but the burden is still on the Examiner to provide it.

The above-discussed rejection over Polak in view of Orikasa '160 is **not** a new ground of rejection. Applicants responded to this rejection in the amendment filed January 15, 2004. Thus, as Applicants' attorney noted at the above-referenced interview, it was error for the Examiner to find that these arguments are moot simply because additional new grounds of rejection were made. Moreover, while the Advisory Action dated February 20, 2004 did include a response to arguments, the Advisory Action refused entry of the amendment to which it was in response, and thus it is not even clear to what extent the Examiner's response is part of the record. Filing of the RCE forced entry of this amendment and thus, the Examiner was required to address relevant arguments made therein. **Applicants therefore respectfully submit that if the present amendment does not put this application in condition for allowance, then the next Office Action not be made Final.**

For all the above reasons, it is respectfully requested that the rejections over Polak in view of the secondary references be withdrawn.

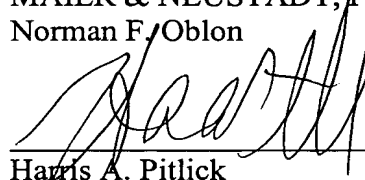
Regarding paragraph 2 of the Office Action, the substitute specification filed July 15, 2004 did include a marked-up copy thereof, as was verified during the above-referenced interview. Accordingly, it is respectfully requested that the finding at paragraph 2 of the Office Action be withdrawn.

Application No. 09/986,005  
Reply to Office Action of August 12, 2004

All of the presently pending claims in this application are now believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Respectfully submitted,

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A handwritten signature in black ink, appearing to read "H. Pitlick", is written over a horizontal line.

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